

The Chords in Your Voice

for Vibrant Souls

"Every voice has a diamond in the rough. The work here is to uncover it."



A VIBRANT SOULS CLASS · AURALEE THOMPSON · SET YOUR
VOICE FREE

THE BIG IDEA

One note is never one note

Sing one steady note and you are really singing a whole **stack of notes at once**. Your voice is made in two parts: the **vocal cords** — two soft flaps in your throat working like a fast valve, springing open and shut about 131 times a second on a low C — make a buzz full of hidden notes called **harmonics**. Then the buzz travels up a **tube** — your throat and mouth, the vocal tract — and the tube turns some of those hidden notes up and some down. The cords supply the metal; the tube does the alchemy.

The hidden notes are never random. Because the valve repeats so steadily, the only extra notes that fit are exact whole-number multiples of the bottom one: $\times 2$, $\times 3$, $\times 4$, and so on. And listen to what those multiples spell:

HARMONIC	FREQUENCY	NEAREST PIANO KEY	OFF THE KEY BY	THE INTERVAL IT ADDS
H1 (×1)	130.8 Hz	C3 — your note	0 — dead on	the fundamental
H2 (×2)	261.6 Hz	C4	0 — dead on	an octave
H3 (×3)	392.4 Hz	G4	+2 cents	a fifth
H4 (×4)	523.3 Hz	C5	0 — dead on	a fourth
H5 (×5)	654.1 Hz	E5	-14 cents	a major third
H6 (×6)	784.9 Hz	G5	+2 cents	a minor third
H7 (×7)	915.7 Hz	Bb5	-31 cents — clearly flat	a flat (dominant) seventh — the misfit
H8 (×8)	1046.5 Hz	C6	0 — dead on	an octave again

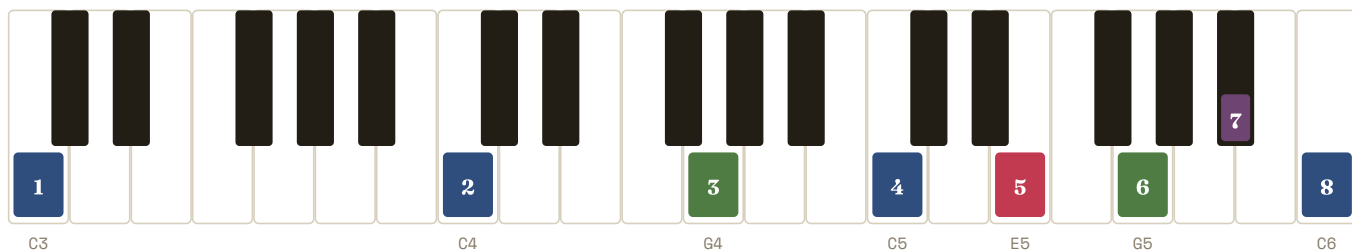
Octave, fifth, fourth, major third, minor third: **a major chord, built from the bottom up, inside every note you sing.** Music theory didn't invent these intervals. It found them. (100 cents = one piano key.)

TRY YOUR OWN VOCAL ALCHEMY

Make a piano answer your voice

A piano string rings on its own when its note is already in the air — **sympathetic resonance**. Every string normally sits muffled under a felt **damper**; pressing a key lifts the damper off, and pressing slowly means the hammer never strikes: no sound, but the string sits open, listening. Press slowly but **all the way down** — the damper only clears near the bottom of the keystroke.

- ① Press the sustain pedal down and hold it (this lifts every damper). Sing a loud, clear low C toward the strings for three seconds. Stop singing. Listen: the piano sings the chord back.
- ② Cleaner version: silently hold down C4, G4, C5, E5, then sing low C. Only those strings are free — only your harmonics can answer.
- ③ **The control test:** silently hold D4, F4, A4 instead — notes *not* in your stack — and sing the same low C. Near-silence. That silence is the gift: it proves the ringing isn't random.



low C — the note you sing

three octaves higher

HARMONIC 7

The one that fights the piano

Every seventh harmonic of every piano-tuned note lands about **31 cents flat** of the nearest key — the mismatch is baked into how pianos divide the octave. Pianos shave every interval a whisker so all key signatures work; tuners literally count the beats per second to set it. Your voice never signed that treaty: its ladder comes out in pure whole-number ratios automatically, and between notes it can land any interval pure. That's why unaccompanied voices can tune until the beating stops and the chord locks into one ringing object.

THE TUBE

The space above the cords shapes the buzz

As long as its walls stay quiet, the tube can't add any new notes — it can only turn some harmonics up and some down, like volume sliders — because the tube has **favorite spots** (resonances) where the air inside joins in and swings along. Move your mouth and the spots move. **That's all a vowel is.** Spot 1 lives in your jaw (drop it and the spot climbs); spot 2 lives in your tongue (arch it forward toward "ee" and the spot rises; draw it back toward "oo" and it falls); round your lips or settle the larynx and every spot slides down together. (The jaw and tongue are each spot's lead player, not its only one — the lips, the soft palate, and the tongue's flex all share the controls.)

Try your own vocal alchemy — two proofs, no equipment

The whisper proof: whisper "ee — ah — oo." No buzzing cords, no stack — yet the vowels still change. Rushing air makes a hiss, and the tube filters hiss exactly as it filters buzz. You are hearing the tube's favorite spots, traced in hiss.

The separation drill: keep the jaw loose and still, and glide the tongue between "ee" and "oo" — you just moved spot 2 all by itself. Park the tongue, swing only the jaw — spot 1 alone. Two windows, two independent handles.

The melody hiding inside one note

Here is the strangest gift of the stack: hold **one** note and sweep spot 2 slowly from harmonic to harmonic, and the harmonics it lands on ring out one after another — **a tune, played inside a single pitch**. You make this exact motion every time you speak, so a melody is always hiding in your vowels. Yet almost nobody hears it, because the brain files moving harmonics as *words trying to be said*, hands melody duty to the bottom note, and calls everything above it tone color. Brain researchers in Heidelberg found listeners split into two camps — **fundamental listeners** and **overtone listeners**, the two styles leaning on opposite sides of the hearing centers — and experienced musicians land far more often on the overtone side. The line between the camps is crossable, and crossing it is ear training.

Try your own vocal alchemy — hear your own hidden melody

Hold one comfortable note and slowly morph "ee-oo-ee-oo," jaw still, lips easy. Listen *above* your note for a faint whistly shimmer sliding up and down — that is spot 2, sweeping across your harmonics. Then whisper the same "ee-oo": with the buzz gone, the sweep is all that's left. The Lab's Hidden Melody station sends you on a field trip to the master himself: overtone singer Wolfgang Saus hides a melody inside one held note and reveals it listen by listen at oberton.org (English version available) — go in cold and play his samples in order. One warning from experience: this is a one-time-a-song deal. Once your brain finds the melody, it will never be hidden from you again.

SOUND PAINTING

Same note, any color

A trained singer holding one note is still making choices every instant: **how firmly the cords meet** (barely touching = hazy and breathy; cleanly meeting = clear and full — measured healthy singing runs open 62% of each cycle, sealed 38%), **how long the tube is** (shorter = brighter, longer = darker), and whether to **gather the high harmonics into a ring**. None of it changes the pitch. All of it changes the color. Singers call the classic blend **chiaroscuro** — bright-dark — a warm, deep tube *and* a gleam on top.



What does ring sound like? Tap a wine glass: after the tap, the sound keeps shining. Some voices carry that same gleam on every note — singers call it **ring** (opera's word is **squillo**, ring like a bell). The gleam has an address: the **ring band**, roughly 2,500–3,500 Hz. Trained voices gather their upper favorite spots into one tall peak there — no new energy, the same three resonances rearranged; measured

opera voices run about 15–19 dB above untrained voices in that band. And here is the promise in one image: *ring* with your voice, and you encase your beautifully exposed vocal diamond in a band of gold. It is how we dress up our voice.

WHY RING MEANS BEING HEARD

The amplification chain

Your listener's ear is a tube too — a canal about as long as the last joint of your little finger — and like every tube it has favorite spots. Its favorite is near **3,000 Hz**, boosted roughly **+20 dB** before the eardrum even moves. An orchestra's energy piles up near 500 Hz and leaves that zone quiet. So the boosts chain, and decibels in a chain simply add:

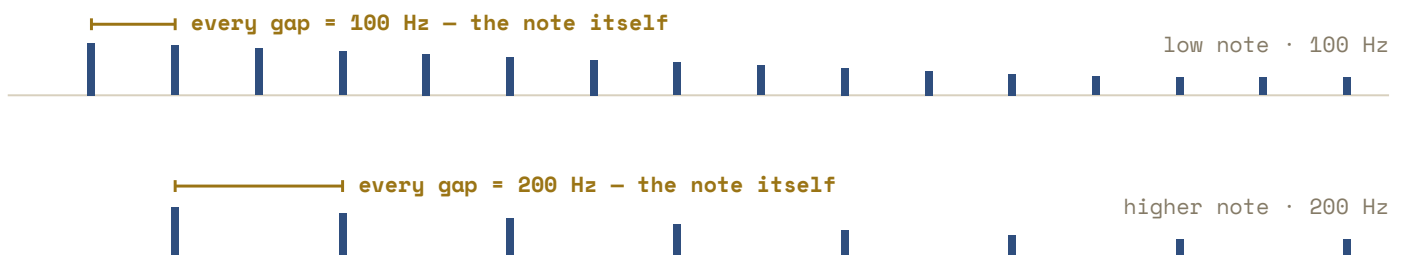
your gathered ring ($\approx +15$ dB) + the listener's ear ($\approx +20$ dB) = $\approx +35$ dB — ring-band waves arriving about $56\times$ taller than they'd otherwise be.

And +15 is more impressive than it sounds: harmonics arrive up there already 25–30 dB quieter than the bottom note. Ring is rescue, not gilding — it lifts faint harmonics into competition exactly where the ear is waiting to double the favor. Newborn babies broadcast in this same band by instinct; smoke alarms are parked there on purpose. Everyone who truly needs to be heard ends up in the same place.

WHEN THE NOTE CLIMBS

Move the window to track the note

As pitch climbs, the whole stack slides upward — and it stretches too, because the gap between harmonics always equals the bottom note itself. Watch it below: a low note packs its teeth close; a higher note spreads them wide.



If your favorite spots stay parked where regular speech left them, the climbing harmonics slide right past and the sound collapses — the harmonic windows (a window is a favorite spot, seen from the stack's side) are left empty. The deepest trick in singing is moving the window to track the note: sopranos **drop the jaw with the note** so spot 1 tracks the pitch itself (untrained singers begin doing this by instinct around E5); beltters park spot 1 on the second harmonic — the maintained call. Around E4–G4, almost every male voice meets **the passaggio**: either chase

H2 with an ever-more-open yell, or make the turn — let the vowel round (“ah” softening toward “aw”), let spot 1 slip down out of H2's way, and hand the job to H3. In measured tenors, H3 takes charge on just 2% of tones at Eb4 and 99% by G4; each vowel turns at its own height, about an octave below its own spot 1.

And the women? Same wall, opposite door. A woman's speaking spot 1 sits higher, so her second harmonic clears it — but near the top of the staff, **H1, the note itself**, arrives underneath spot 1. Her escape is the **whoop**: open the jaw tall and take spot 1 *up* to travel with the note itself. So the men slide the window down and hand the shine to H3; the women take the window up to rise with H1. Opposite directions — same artistry: keep a window where your power is.

PRACTICE MAP

Try your own vocal alchemy — the short list

- ① **The piano experiment** (above) — hear your chord with your own ears, control test included.
- ② **The breathy-to-bright test:** hold one pitch at one loudness and slide from a soft breathy “ah” to a bright buzzy one into a free spectrogram app. The bottom stripe stays put; the *count* of stripes grows. That count is tone of voice.
- ③ **The whisper glide and separation drill** (above) — learn your two window-handles.
- ④ **The singing glasses:** pour different water levels into wine or champagne glasses, wet a fingertip, and circle each rim slowly until it sings. Shape and space choose every note. (A fuller glass sings *lower* — heavier walls; but remember, your air-filled tube runs the other way: smaller space, higher favorite spot.) Then say it out loud: every vowel is a glass made of you — wide? tall? how full?
- ⑤ **Paint one phrase three ways:** the same line hazy, then clear and warm, then bright and ringing. Same notes. Three colors. That difference is the painting.

WORDS TO KNOW

Harmonic — a hidden note in the stack; always a whole-number multiple of the bottom note.

Vocal cords (folds) — the fast valve in the larynx whose puff-train is the buzz.

Resonance (favorite spot) — where tube-shape and sound wave agree, like friends who love the same thing; the sound grows.

Color (timbre) — everything that isn't pitch or loudness: the recipe of hidden notes.

Fundamental — the bottom note (H1); the pitch your brain reports.

Vocal tract (“the tube”) — throat + mouth; the filter that shapes the buzz.

Harmonic window — a favorite spot seen from the comb's side; harmonics light up in its view.

Whoop — the women's turn: spot 1 rising to track H1, the note itself.

Sympathetic resonance — a tuned object ringing from across the room.

Chiaroscuro — bright-dark: warm depth and gleam at once.

Cent — $1/100$ of a piano key; ears notice ~ 10 – 20 .

dB (decibel) — compares two sound strengths; -6 dB $\approx$ half the wave's size.

Ring band — $\approx 2,500$ – $3,500$ Hz; the singer's gathered gleam, pre-amplified by every ear.

Passaggio — the stretch where rising H2 collides with spot 1 and strategy must change.

Hz (hertz) — vibrations per second; double it and you rise an octave.

Play with all of it — with sound: this handout is the printable companion to **The Resonance Lab**, the interactive version where every idea on this page can be heard, sung into, and moved with your own hands. Ask your teacher for the link. Numbers on this page trace to the published voice-science literature (Sundberg, Titze, Castle, Joliveau, Schneider, and colleagues; the hidden-melody reveal is Wolfgang Saus's method); measured values are averages and every voice differs.

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